

REMARKS

In order to expedite the prosecution of the present application, the subjects matter of Claims 2, 13 and 17 have been respectively incorporated into Claims 1, 12 and 16. No new matter has been added.

Claims 1-3, 10 and 12-15 have been rejected under 35 USC 103(a) as being unpatentable over Ginosar et al. Claims 16-19 have been rejected under 35 USC 103(a) as being unpatentable over Bayense et al. Applicants respectfully traverse these grounds of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a method for manufacturing an ester through transesterification. The claimed invention requires the steps of bringing a starting material ester in a liquid-phase state and an alcohol in a vapor-phase state into contact with a solid acid catalyst consisting of either an amorphous zirconium oxide and aluminum oxide, an amorphous zirconium oxide and phosphorus oxide or an amorphous zirconium oxide and titanium oxide.

As explained during the previous prosecution of the present application, the instant invention overcomes the problems associated with prior art transesterification reactions by providing a method for conducting a transesterification reaction which can be conducted in a short period of time and under a pressure on the order of a normal pressure. The catalyst used in the reaction and the product produced by the reaction are easily separated from each other which makes the claimed method more efficient. The utilization of a catalyst consisting of an amorphous zirconium oxide and at least one oxide selected from the group consisting of aluminum oxide, phosphorus oxide and titanium oxide provide very high conversion rates in the inventive transesterification reaction. It is respectfully submitted that the presently claimed invention is clearly patentable over the prior art cited by the Examiner.

The Ginosar et al reference discloses a process for producing alkyl esters used in biofuels and lubricants through the transesterification of glyceride- or esterification of free fatty acid-containing substances in a single critical phase medium. The input glyceride- or free fatty acid-containing substance is dissolved with an alcohol or water into a critical fluid medium, the glyceride- or free fatty acid-containing substance reacted with the alcohol or water input over either a solid or liquid acidic or basic catalyst and the products separated from each other and from the critical fluid medium.

In the outstanding Office Action, the Examiner states that the difference between the present claims and Ginosar et al is that the instant claims are limited to the contents of the metals in the catalyst and phase of the alcohol in the reaction process, whereas the Ginosar et al reference suggests the use of "alcohol steam" and is silent on the elemental contents of the catalyst. Applicants are assuming that the Examiner means "alcohol stream" as Ginosar et al has no disclosure with respect to "alcohol steam".

In Ginosar et al, the reactants enter a reactor, whether batch or continuous, are dissolved in a critical fluid and the critical fluid forms a single-phase medium in which diffusion of the reactants into different liquid phases is eliminated and mass transfer limitations are essentially eliminated to thereby increase the overall reaction rate (column 2, lines 21-26 and column 5, lines 22-26). As stated in Claim 12 of this reference, the reaction occurs in a single phase to produce a final product.

In contrast to the Ginosar et al reference, the presently claimed invention requires that the reactants be in two different phases, an ester in a liquid phase and an alcohol in a vapor phase. As such, the reaction does not require a high pressure. Since the reaction system of the present invention is completely different from that of Ginosar et al, the results achieved by the present invention would not be obvious

in view of this reference. Ginosar teaches the reaction occurring in a single phase while the present invention requires a reaction occurring between an ester in a liquid phase and an alcohol in a vapor phase. Additionally, there is no disclosure in this reference of a specific example using an amorphous catalyst including amorphous zirconium oxide or the specific effect of the amorphous zirconium oxide over crystalline zirconium oxide as demonstrated in Tables 1-3 in the present specification. As such, it is respectfully submitted that the presently claimed invention clearly is patentably distinguishable over Ginosar et al.

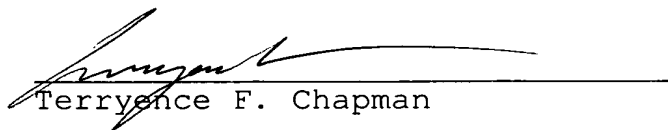
The Bayense et al reference discloses a process for the transesterification of carboxylic acid esters in which a catalyst is used which is substantially insoluble in a reaction mixture under reaction conditions. The catalyst comprises at least one silicate of Group IVB elements. At the outset, the consisting essentially of language used in Claim 16 expressly excludes the critical silicate of this reference therefrom. Moreover, although this reference discloses the use of titanium-containing silica catalysts, there is no example in this reference of a catalyst using zirconium. Bayense et al additionally states that the silicates can either be crystalline silicates or amorphous silicates and does not show any preference between the two. As such, there is no teaching in this reference regarding the advantages of using amorphous zirconium oxide over crystalline zirconium oxide.

The superiority of the presently claimed amorphous zirconium-titanium catalyst of currently presented Claim 16 over a zirconium-titanium catalyst containing a crystallized part is shown in test Examples 2 and 19 in the present specification as compared to the partially crystallized catalyst of test Examples 1, 3-5, 18 and 20-22. The amorphous catalyst of the present invention having the specified components in the specified compositional range exhibited high conversion rates and enabled the production of the target

esters with a good efficiency as compared to the catalysts which contain partially crystallized components. This is clearly unexpected in light of the prior art cited by the Examiner and further establishes the patentability thereof.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,


Terryence F. Chapman

TFC/smd

FLYNN, THIEL, BOUTELL
& TANIS, P.C.
2026 Rambling Road
Kalamazoo, MI 49008-1631
Phone: (269) 381-1156
Fax: (269) 381-5465

David G. Boutell
Terryence F. Chapman
Mark L. Maki
Liane L. Churney
Brian R. Tumm
Donald J. Wallace
Dale H. Thiel
Sidney B. Williams, Jr.
Heon Jekal
*limited recognition number

Reg. No. 25 072
Reg. No. 32 549
Reg. No. 36 589
Reg. No. 40 694
Reg. No. 36 328
Reg. No. 43 977
Reg. No. 24 323
Reg. No. 24 949
Reg. No. L0379*

Encl: Postal Card

136.07/05